CHAPTER 3
Resource Functions and Considerations

INTRODUCTION

The present chapter identifies the primary water resource functions of Lake Istokpoga that are to be protected by the proposed minimum level, and it discusses related resource protection issues, policies and procedures. The chapter also identifies the baseline resource conditions for assessing *significant harm,* as set forth in Section 373.0421(1)(a), F.S., which allows the water management districts, when setting a MFL, to consider changes and structural alterations that have occurred to a water resource.

WATER RESOURCE FUNCTIONS

Water resources within the Lake Istokpoga watershed serve a variety of functions that need to be considered in MFL development, including water supply, flood control, water quality, wildlife habitat, navigation and recreation. The Lake Istokpoga watershed can be divided into different hydrologic components, each associated with a different water body having unique characteristics (**Figure 10**). A discussion of these hydrologic units is provided in the Surface Water Hydrology subsection of **Chapter 2**.

Water Supply and Flood Control

Flows of surface water in the upper Lake Istokpoga watershed may be stored in Lake Arbuckle or Lake Josephine or directed toward Lake Istokpoga generally through two major tributaries: Arbuckle Creek and Josephine Creek. These water inflows into Lake Istokpoga may then be stored or passed downstream for water supply or released to the Kissimmee River or Lake Okeechobee.

Lake Istokpoga water levels are regulated within a narrow range ($\pm$ 2 ft) to support two primary goals: flood protection and water supply. The annual regulation schedule requires lowering the lake during the summer to provide storage and flood protection during the rainy season. The regulation schedule also requires increasing lake levels during the winter when flooding potential is low and water supply needs are highest (**Figure 11**). This schedule is opposite the natural annual cycle in which lake levels rise to their highest in the summer and decline during drier winter months.

Water from Lake Istokpoga is released through two primary routes. The G-85 Structure discharges water from Lake Istokpoga into the Istokpoga Canal, which flows eastward to the Kissimmee River. And at the south end of Lake Istokpoga is S-68, a gated

water control structure that discharges into the C-41A Canal; water releases from the S-68 are generally routed into the Kissimmee River and/or to Lake Okeechobee. An extensive network of drainage ditches to the south of Lake Istokpoga drains agricultural lands and provides a source of irrigation water during the dry season. The ability to pass water quickly through drainage canals is necessary for flood protection during the rainy season, when frequent localized heavy rains occur.

Indian Prairie and the Brighton Indian Reservation, in Glades County south of Lake Istokpoga, are supplied with water mostly from Lake Istokpoga. The Brighton Reservation's primary land use is agriculture, and the Lake Istokpoga–Indian Prairie basin has historically experienced water shortages. The 1987 Water Rights Compact signed by the Seminole Tribe of Florida, the State of Florida and the SFWMD establishes the Tribe's water entitlement for the Brighton Reservation (see **Appendix A**). Although water supply releases from Lake Istokpoga may affect lake level decrease rates, the current regulation schedule does not allow water releases to below 37.0 feet NGVD (see **Figure 11**), and in this sense this agreement is not expected to affect the proposed minimum level.

Water Quality

Water quality within the Lake Istokpoga watershed can vary considerably by site. Isolated wetlands may contain water of relatively high quality, but water bodies associated with or downstream of agricultural lands can have significant water quality problems. The proliferation of weedy plant species, which can affect fish and wildlife habitats, is supported by elevated nutrient inputs from upstream sources and also by unnatural hydropatterns.

The primary sources of water to Lake Istokpoga are rainfall and tributary inflows. Tributary inflows, especially from Arbuckle Creek, are typically of lower quality (O'Dell *et al.* 1995). The results of a pollution risk analysis indicate that many areas surrounding Arbuckle Creek and Lake Istokpoga as well as many areas lying southward toward Indian Prairie have a moderate risk for causing nutrient pollution (nitrogen and phosphorus) (**Figure 22**). Results from monitoring efforts in Lake Istokpoga indicate that water quality has been affected by land uses of areas surrounding the lake and also by lake level regulation and aquatic-plant management activities (**Tables 7**, **8** and **9**).

Recreation and Navigation

Lake and river recreation are important activities in the Lake Istokpoga watershed. The many wetlands and surface waters in the watershed provide extensive opportunities for recreational boating (including canoeing), camping, fishing, wildlife observation, hunting and swimming. Many of these uses depend on the ability of water levels, water flow and water quality to support healthy plant and animal communities. Recreation on the many lakes, wetlands and creeks within the watershed provides a significant economic base for the region.

Fish and Wildlife Habitat

The Lake Istokpoga watershed contains some relatively undeveloped creeks and lakes. The watershed also borders the Kissimmee River Basin, which is currently undergoing a comprehensive restoration effort. The remaining water bodies and wetlands provide important wildlife habitat for a large array of birds, including osprey, bald eagles, sandhill cranes, wading birds, ducks, migratory birds and other species of concern (FWC 2000, Stewart 2001). Aquatic habitats support a fishery that has significance for wildlife and for recreational fishing. Maintenance of sufficient water depths and hydroperiods within these water bodies is required in order to protect existing plant and animal communities. The larger lakes in the watershed provide important habitat for freshwater fish—including largemouth bass, bluegill, crappie and catfish—that are important to recreational fishing interests, wading birds and raptors. Aquatic beds within lakes provide important habitat for freshwater organisms, many of which are a food source for fish and other wildlife. Swamps along the lake margins contain a number of species of trees and shrubs that provide important specialized wildlife habitats.

The Division of Fisheries Management of the FWC lists Lake Istokpoga as one of Florida's top ten lakes for catching largemouth bass, black crappie and bluegill. Overall, the FWC estimates Lake Istokpoga's sport fishery to be valued at $6 million annually (FWC 2002). Lake Istokpoga is also known for its significant bird population, which includes a number of federally designated threatened and endangered species. The wading bird rookery on Bumblebee Island in Lake Istokpoga is one of the most important rookeries in the area, and studies of osprey along the lake have documented one of the largest concentrations of active nests ever found (Stewart 2001).

ALTERATIONS

Hydrologic Changes

During the past century, changes made to provide drainage, water supply and flood protection for homes and farms and to improve lake access have irreversibly altered the structure and biological resources of Lake Istokpoga. These changes include the following:

- Alterations of natural hydrologic patterns and variability, which have allowed increased residential development along the lake, encouraged the expansion of undesirable weedy plant species into habitats important to fish and wildlife, and promoted the proliferation of floating vegetation mats that interfere with navigation (and can clog water control structures).
- Reduction of water tables, which has reduced the extent of wetlands, stressed remaining wetlands, and encouraged development into areas that were previously flooded.

- Drainage of wetlands within the historic Lake Istokpoga floodplain for development purposes.
- Diversion of natural water flows.
- Alteration of natural watercourses and shorelines.
- Construction of drainage ditches and canals.
- Changes to seasonal flooding patterns to provide maximum water levels during the dry season and minimum water levels during the wet season.

Water Quality and Biological Changes

Water quality changes in the Lake Istokpoga subbasin during the past 50 years are associated mostly with the expansion of agriculture in the region. The effects of fertilizer and pesticide runoff from agricultural croplands in this region are reinforced by the general sterility and high leaching capacity of the sandy soils and by the relatively high annual rainfall amounts across the region (**Table 1**). Runoff from feedlots and from other intensive cattle-raising operations is a significant source of nutrients and pathogenic organisms (see Zahina *et al.* 2001b). Lake Istokpoga was historically a sandy-bottom lake (FWC 2000), but today many areas have extensive organic substrate deposits. Flattening of natural water level fluctuations has stimulated the production of vegetation communities and the deposition of nutrient-rich organic sediments and has inhibited the natural historical cycle of degradation, compaction and oxidation.

Eutrophication of Lake Istokpoga has supported the expansion of weedy plant species that were once much less common along the lakeshore, including cattail and pickerel weed, which have replaced much of the littoral marsh community and have filled in the lake's shallow open-water areas. In addition, hydrilla has expanded explosively within Istokpoga's aquatic habitats and has displaced entire native communities of desirable vegetation (FWC 2000).

CONSIDERATIONS AND EXCLUSIONS

Once identification has been made of the functions and features of the water resource slated for protection by a specific minimum flow or level, determination must be made of the water resource's baseline conditions upon which the assessment of *significant harm* will be based. The basis for making this determination of baseline conditions is set forth in Section 373.0421(1)(a), F.S., which requires the water management districts setting the MFL to consider changes and structural alterations that have occurred over time to the original water resource. Section 373.0421(1)(b), F.S., provides for exclusions from that requirement by recognizing that certain water bodies no longer serve their historical function and that recovery of these water bodies to historical conditions may not be feasible.

Considerations

Lake Istokpoga has a variety of features and functions that affect, or are affected by, the need to establish a minimum level and that therefore must be considered when defining the minimum level, including the following:

- Natural systems, including aquatic vegetation communities, wetlands, fish and wildlife.
- Hydrology.
- Water supply.
- Flood protection.
- Water quality.
- Navigation and recreation.

Natural Systems

During the past century, natural systems in Lake Istokpoga have been significantly altered by human activities. Some areas of the lake do remain in fairly good condition, although many of these areas have to be maintained artificially through vegetation control projects. Maintenance of aquatic communities, littoral zone marsh and lake swamp is important for many reasons—namely, the provision of habitat for wildlife use; recreation and support for the local economic base; and aesthetic values. Significant areas in the watershed have been permanently changed from natural landscapes to urban and agricultural land uses.

Hydrology

Activities associated with drainage, water supply and flood control have occasioned major hydrologic changes in Lake Istokpoga, including the stabilization of water level fluctuation, the elimination of extreme events and the alteration of the timing of high/low water periods. These hydrologic changes have significantly modified the frequency, timing and duration of the lake's natural water level variations, they have led to alteration of biological communities within the lake, and they have negatively affected natural physical processes that once served to improve and maintain water quality.

Water Supply

Management of the lake as a water supply source is one factor incorporated into the current operational schedule. Water supply releases from the S-68 are not allowed when water levels fall below a minimum lake level (**Figure 11**). Section 373.042(a), F.S., prohibits that any water supply withdrawal, whether existing or future, cause *significant harm* to the water resource or to the ecology of the area. Once the minimum level is

established, the need to meet existing and future reasonable-beneficial water supply requirements must be factored into a recovery and prevention strategy, as explained in Section 373.0421(b), F.S.

Flood Protection

The construction and management of numerous drainage canals and associated water control structures upstream and downstream of Lake Istokpoga have significantly altered the natural drainage and flooding patterns of the area. Water levels in Lake Istokpoga are managed so as to reduce the potential for flooding of surrounding private lands and residences. Any proposed minimum level will meet or exceed existing levels of flood control.

The need to protect developed lands adjacent to the lake from flooding is a constraint preventing the lake from achieving historic high water levels. Some areas of former wetland forests adjacent to the lake can never be effectively reflooded and represent a permanent change from wetland to upland resources.

Water Quality

Water quality is most directly affected by continuous inputs of pollutants from upstream runoff sources; efforts are under way to reduce these inputs over time. The relationship between water levels and water quality is less direct, associated with deposition of organic sediments, proliferation of tussocks and management of aquatic weeds. These indirect effects will be considered during development of minimum level criteria.

Navigation and Recreation

Navigation and recreation on Lake Istokpoga are negatively affected by low water levels, which restrict boat access to the lake. Any proposed minimum level will consider this impact of low water levels on lake recreational activities and will keep in mind the need for lake access.

Exclusions

As described in **Chapter 1**, Section 373.0421(1)(b), F.S., recognizes that in certain cases a water body may no longer serve its historical function and recovery of this water body to its historical condition may not be practical or feasible. But District staff determined that it was not appropriate to apply this exclusion to Lake Istokpoga relative to establishment of a minimum level. Lake Istokpoga and its associated habitats have indeed been, and continue to be, greatly altered by economic development in the basin and by needs for flood protection and water supply, so much so that full recovery of historic water level characteristics of the lake and of its associated tributaries and wetlands may not be technically or economically feasible. Nevertheless, the need to protect and enhance the remaining natural features in the system is clearly identified, and

the consideration in Section 373.0421(1)(a), F.S., seems to address adequately the changes and alterations in water resource functions applicable to these areas. As a result, there is no apparent basis to invoke the exclusion in Subsection 373.0421(1)(b)1, F.S. The remaining exclusions in Subsections 373.0421(1)(b)(2–3), F.S., pertain to water bodies less than 25 acres in size or to constructed water bodies and therefore do not apply to Lake Istokpoga.

In summary, the SFWMD will establish a minimum level for Lake Istokpoga based on consideration of structural alterations to the resource, as allowed pursuant to Section 373.042(1)(a), F.S. Section 373.042(a), F.S., prohibits allowing *significant harm* to be caused to the water resources or ecology of the area by existing or future water supply withdrawals. Once the minimum level is established, the need to meet existing and future reasonable-beneficial water supply requirements must be factored into the recovery and prevention strategy.